January 21, 2000

Mr. Greg O'Donnell, P.E.
Technical Director
Bord na Mona Environmental Products U.S., Inc.
P.O. Box 77457
Greensboro, NC 27417

Dear Mr. O'Donnell:

As part of GMP #69 issued June 9, 1995, Bord na Mona Environmental Products U.S., Inc., voluntarily entered into an experimental protocol designed to collect data to determine if the State Health Commissioner would grant a waiver to the issuance of an experimental operating permit for Puraflo™ systems pursuant to 12 VAC 5-610-370 C of the *Sewage Handling and Disposal Regulations* (the *Regulations*). This letter is to advise you that the Virginia Department of Health (VDH) is rendering a decision on the experimental protocol originally established for the Puraflo™ system in GMP #69 and subsequently revised and readopted as GMP # 79 and GMP # 93. The Department is rendering a decision at this time because we believe the results received to date show consistency and stability of the process over more than 18 months (the originally envisioned experimental period). This consideration, along with the potential benefits to the citizens of the Commonwealth of having a wastewater system that significantly expands the site characteristics where wastewater can be safely disposed has prompted the Department to act at this time.

The full-scale experimental demonstration project can be defined in terms of three objectives. These objectives were to test:

1. Modified sizing criteria resulting in a smaller absorption area than a system receiving septic tank effluent. The new criteria were based upon improved effluent quality and included use of trenches, beds (or pad area), and a combination of the two.

2. Installation depths less than 18 inches and as shallow as at-grade.

3. Revised stand-off distances to water tables ranging from six inches to 12 inches as specified in GMP #93.

A total of 260 systems were installed during this demonstration period and 24 systems were monitored for their performance. Performance monitoring was conducted by Old Dominion University (ODU) and included monthly testing for BOD_5, TSS and fecal coliform removal efficiency of the modules, nitrogen dynamics through the system, fecal coliform monitoring 12 inches beneath the absorption pad and monitoring of phosphorus, chlorides, temperature and pH.

An evaluation of the physical system performance was made during each sampling event. In addition to the performance testing, each year for three years random visits were made of about a dozen systems throughout the state during the early spring. The purpose of these visits was to observe systems during stress (wet) conditions and evaluate user satisfaction.

During the demonstration period there have been two reported surface failures. Both of the reported failures were immediately investigated. In one case the report was found to be erroneous. In the second instance, the system was failing for several days. While the cause could not be definitively identified, it appears probable that the cause was a fixture leaking or left running while the occupants were away.

Based on the observations made by VDH and ODU personnel and anecdotal evidence and experience informally reported by local health department personnel, it appears that the Puraflo™ system has functioned satisfactorily in terms of effluent disposal. Consequently, I find that the revised sizing criteria and reduced installation depth criteria employed in GMP #93 have been operationally demonstrated to my satisfaction. Of the three experimental objectives noted above, the issue of the reduced separation distance remains to be considered.

The fecal coliform standard established in the protocol was 10 fecal coliform units (fcu) per 100 ml average (geometric mean) in all the grab samples and no individual grab sample was to exceed 200 fcu. This parameter was to be measured 12 inches below the bottom of the absorption area. This part of the standard was intended to evaluate the system's performance on sites with reduced stand-off to water table and on sites where shallow or at-grade installation was utilized to overcome site and soil limitations.

The results of the study indicated that the geometric mean of the septic tank effluent received by the Puraflo™ treatment units contained 1.3×10^6 fcu per 100 ml. Effluent from the Puraflo™ treatment units averaged 263 fcu per 100 ml. At a depth of 12 inches below the pad area the average fecal count was 154 fcu per 100 ml. At a 95% confidence interval this apparent difference was not significant. The geometric mean of the samples exceeded the limit established in the protocol and numerous individual samples exceeded 200 fcu per 100 ml. After considering the data received to date, I can only conclude that the results fail to show the Puraflo™ system met the treatment standard established in the protocol.

In evaluating the fecal coliform results I believe an element of judgement is appropriate and that it would be wise to consider other research in the field and what is known about functioning of residential onsite systems. After having benefited from the knowledge and insight of other researchers in government, higher education, and industry I am satisfied that the standard established in this protocol will protect public health and is achievable using existing technology. The fact that the Puraflo™ system failed to meet the established standard in the protocol begs an explanation. The most probable explanation, as you have suggested, is that the sampling methodology was flawed and resulted in higher than expected fecal counts in the soils beneath the units. In retrospect, it appears plausible that the study may have had several *potential* flaws. This letter is not intended to discuss these considerations in detail but rather to advise you of the scope and nature of my deliberation and to communicate my decision.

An element of my consideration is comparing the relative risks of applying Puraflo™ effluent in the receiving environments evaluated in this protocol with other existing regulatory criteria. The relative risks, while not necessarily quantitative, should make sense in terms or their relative ranking and can *assist* in reaching a decision. Under GMP #93, the use of the Puraflo™ system in soils with estimated or measured percolation rates between 5 and 25 minutes per inch (MPI) requires a six inch standoff to water table. Comparing this standard to the 2 to 6 inches allowed in our current *Regulations* for septic tank effluent in similar soils clearly shows the cleaner Puraflo™ effluent is released into an environment further from the treatment limiting feature (i.e., the water table). While not necessarily supported by the data in *this* study, it appears that the Puraflo™ system as used in GMP #93 provides at least the same or better public health protection when compared to systems designed in compliance with the current *Regulations*. At rates between 25 and 50 mpi the standoff distance to water table mirrors the *Regulations* for septic tank effluent. I would expect less public health risk from an advanced secondary effluent such as that produced by a Puraflo™ unit than from septic tank effluent. Again, the relative ranking of risks favors approval. Above 50 mpi the standoff distances are the same as those previously approved under GMPs #20 and #97 for secondary effluent. In this case the risks associated with a Puraflo™ system and a GMP #20 or #97 system appear approximately equal.

Therefore, it is my carefully considered opinion, that even though the fecal coliform test results collected in this study failed to pass the standard established in the protocol, I am granting a waiver of the experimental criteria established in §370 of the *Regulations* for the Puraflo™ system. The results of the study, when considered in the context of other research, the limits of the methodologies and site controls employed in this study, and the existing regulatory framework in Virginia, convince me that the system has demonstrated operational competence in full scale testing and that there should be no adverse health risks associated with the continued use of this system.

Therefore, in accordance with section 370 D of the *Regulations*, the Department will propose revisions to the *Regulations,* which will allow the use of the Puraflo™ and equivalent systems. Revising regulations can be time consuming. I am therefore granting a waiver of the experimental requirement in the *Regulations* for the Puraflo™ system for a period of up to three years from the date of this letter while revision to the *Regulations* are proposed. In the event the revision process exceeds three years the Department will reconsider this decision in light of all available information. This waiver is for the Puraflo™ system when used in accordance with Parts I through VI of GMP #93.

Additionally, based on the experience with the operational and maintenance requirements of the Puraflo™ system encountered during this study, I am interpreting the system to be a Type II system. I believe this is in keeping with the spirit of both the *Sewage Handling and Disposal Regulations* and the concept of "pre-engineered septic system[s]" mentioned in a revision to §32.1-163.5 D of the *Code of Virginia*. This means that formal engineering plans and specifications are not required unless the size or complexity of the system warrants them.

The data collected under this protocol also allow two additional decisions regarding the Puraflo™ system. Based on the results received, the Puraflo™ system is granted general approval for 10-10 (BOD_5 and TSS) discharge under the *Alternative Discharging Sewage*

Treatment Regulations for Individual Single Family Dwellings 12 VAC 5-640 et sec. Systems used for this application must comply with the requirements of the *Discharging Regulations*, including but not limited to the requirement for disinfection. The system may also be used as a pretreatment device under GMP #97, if used in accordance with the sizing criteria in the *Sewage Handling and Disposal Regulations* and in compliance with the requirements of GMP #97. These approvals were not requested by Bord na Mona USA and are incidental to the experimental protocol.

In closing, I would like to thank you for the cooperation, effort, and considerable resources that Bord na Mona USA has contributed to this joint public-private sector effort. I believe that all parties have benefited from cooperative work and that ultimately we can both better serve the citizens of the Commonwealth as a result. My staff has indicated that Bord na Mona and in particular Mr. Joe Walsh and you have repeatedly shown professionalism, cooperation and a spirit of helpfulness unique in our encounters. Please know that these courtesies are appreciated and have made the journey together most enjoyable.

Sincerely,

E. Anne Peterson, M.D., M.P.H.
State Health Commissioner

pc: Environmental Health Managers
Health Directors
Constance Ober